



CHARLES DARWIN (1758–1778) AND THE HISTORY OF THE EARLY USE OF DIGITALIS*

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I. INTRODUCTION

Before me lie two books, one a great classic in the history of medicine, the other a little known graduating dissertation of an Edinburgh medical student. William Witherings's *An account of the foxglove and some of its medical uses* was published in Birmingham in 1785. It is a document that would satisfy the medical humanist, as well as the most rigorous scientific thinker, for its prose compares favorably with the best of the 18th century; and its clinical descriptions of the action of digitalis are clear, shrewd and incisive. His deductions, moreover, are based upon a painstaking analysis of evidence, all in the highest tradition of modern scientific medicine.

The medical thesis, on the other hand, which is entitled *Experiments establishing a criterion between mucaginous and purulent matter. And an account of the retrograde motions of the absorbent vessels of animal bodies in some diseases*, was published in the town of Lichfield in 1780, five years before Withering's book, and two years after its lamented author had died of a dissection wound. In this thesis one also finds an excellent description of the therapeutic action of foxglove. The author of this remarkable booklet bore the name of Charles Darwin, and one is astonished to discover that he died in the year 1778, before having attained the twentieth

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year of his age. The name of Charles Darwin is sufficient in itself to arouse curiosity, and for some five years I have been attempting to collect information concerning his career, and concerning the early history of the use of digitalis. My paper, however, which has resulted from this enquiry, will have more to do with Darwin than with digitalis.

The hereditary transmission of mental traits and capacities is nowhere more strikingly illustrated than by the Darwins, who for five successive generations have produced men of outstanding attainments. I need, therefore, scarcely apologize for describing the career of an early and little known member of this remarkable family. Charles Darwin of this memoir died at the age of 19 years and 7 months, a youth of precocious achievements, full of promise and intellectual vigor. His abilities were of a most unusual character; indeed he made so great an impression upon men of his time that, even after 150 years, it has not been difficult to trace from contemporary sources many details of his brief career.

II. EARLY EDUCATION

Charles Darwin was the eldest son of Erasmus Darwin (1731–1802), physician, naturalist, and poet, by his first wife, Mary Howard, the daughter of Charles Howard, a merchant of Lichfield in Shropshire. Charles was born September 3, 1758, in Lichfield when his mother was but 18 years of age. A second son, Erasmus Jr., was born in 1759 and died tragically, probably by his own hand, in 1799 at the age of 40. Erasmus Jr. was given to writing poetry and he had become a successful, through rather eccentric, solicitor in Lichfield some years before his death. Two other children of Mary Howard by Erasmus Darwin died in infancy and the third son, Robert Waring Darwin, who was born in 1766, became a Fellow of the Royal Society at the age of 22 for a paper on ocular spectra (*Philosophical Transactions*, 1788, vol. 76), and was the father of Charles Robert Darwin, naturalist and author of the *Origin of species*. Mary Howard, the mother of these three able boys, became the victim of an obscure disease, probably nephritis incident to child-bearing, and died in 1770, thirteen years after her marriage, when she was scarcely 30 years of age.

Many have commented on the striking fact that Erasmus Darwin transmitted his characteristic qualities of mind to his descendants, and from a close study of Erasmus, the father, and of his son Charles, it seems to me that these peculiar qualities were perhaps more strikingly present in Charles than in the other children. The available data is not complete, but what exists is highly significant. In the short memoir of Charles written by his father as an appendix to his thesis, it is stated that from his infancy he was "accustomed to examine all natural

objects with more attention than is usual: first by his senses simply; then by tools, which were his playthings—By this early use of his hands, he gained accurate ideas of many of the qualities of bodies; and was thence afterwards enabled to acquire the knowledge of mechanics with ease and with accuracy; and the invention and improvement of machines was one of the first efforts of his ingenuity, and one of the first sources of his amusement.

He had frequent opportunities in his early years of observing the various fossile productions in their native beds; and descended the mines of *Derbyshire*, and of some other counties, with uncommon pleasure and observation. He collected with care the products of these countries; and examined them by such experiments, as he had been taught, or had discovered: hence he obtained not only distinct but indelible ideas of the properties of bodies, at the very time when he learnt the names of them; and thus the complicate science of chemistry became not only easy, but delightful to him.

It seems that Charles had inherited stammering from his father and it was the hope that he might be cured by learning French early in life. He was therefore sent to Paris with a private tutor, the Reverend Mr. Dickenson, rector of Blimhill in Shropshire, who was said to have been modest, learned and scientific. During the two years Charles spent with him in Paris no conversation was allowed in English, and Charles returned completely cured of his stammering.

In discussing his son's education, Erasmus gives free expression of his opinion of contemporary pedagogical methods in the following remarkable passage:

Ye classic schools! ye not only overcome the struggling efforts of genius and bind his Proteus-forms, till he speaks the language you require; but you then divert his attention from the nice comparison of things with each other, and from associating the ideas of causes and their effects; and amuse him with the looser analogies, the vain verbal allusions which constitute the ornaments of poetry and of oratory! . . . Mr. *Darwin* acquired a competent knowledge of the latin and greek languages, chiefly by reading books of useful knowledge, or which contained the elements of science: and which were more agreeable to him than the monstrous and immoral tales of heathen mythology, or of fabulous history. He was of opinion, that to study these dead languages so accurately as to criticise their beauties, and at a time when all their books of real value had been repeatedly translated, was a prodigality of labour, which might suit the retirement of a pedant, but was unbecoming an active philosopher: that to acquire a taste for greek poetry by years of ill-employed industry, was not much more important than to acquire the power of playing well on some one musical instrument: and that, in the schools of language as in the schools of drawing a man of science would learn the use of the pen and pencil, as far as they are concerned in the expression or communication of distinct or useful ideas; but to waste the first twenty years of life in learning the metaphors of language, or the drapery of drawing might serve those, who made poetry or painting a profession; but was liable to disqualify the mind of the more energetic pursuits of business or philosophy.

Erasmus Darwin saw in Charles the following traits which he attributed to his mother's influence and inheritance:

Nor amid these acquirements of knowledge was his taste for morality neglected; for his ingenious mother, even to her latest hour! instilled into his breast a sympathy with the pains and with the pleasures of others, by sympathizing herself with their distress or

exultation; she flattered him into a sense of honour by commending his integrity, and scorn of falshood [sic], before her friends: and taught him prudence by pointing out to him the ill consequences of the bad conduct of others, whose names or persons he was acquainted with: and as she had wisely sown no seeds of superstition in his mind, there was nothing to overshadow the virtues, she had implanted.

Charles presumably stayed at the Lichfield school until early in 1775. At all events there is no further record of him until he matriculated at Christ Church in Oxford, and there the only existing record concerning him is the matriculation entry. It reads as follows:

"Charles D.
S. Erasmus of Lichfield W. Staff.
Ch. Ch. Matriculated 30 March 1775 age 16."

(*Foster's Alumni Oxoniensis*).

Charles spent nearly a year at Christ Church, but he came to dislike the atmosphere intensely feeling that his mind was going to seed in the pursuit of "classical elegance," and he "sigh'd to be removed to the robuster exercises of the medical schools of Edinburgh."

III. EDINBURGH

Charles Darwin went to Edinburgh late in 1775, or early in 1776 and, apart from occasional trips home, he remained there until his death. From a letter to him from his father dated April 2, 1776, one gains the impression that by that date he was well established in the University.

The school of medicine at Edinburgh in the second half of the 18th century was the most vigorous in Europe. Robert Whytt, the professor of the institutes of medicine (physiology) [1747–1766], had a few years earlier discovered the principle of reflex action (1751). The experimental method was also being inculcated in students by his successor, William Cullen [1766–73] and by *his* successor, James Gregory, who was professor of the institutes from 1776 until 1781. Alexander Monro, II, the anatomist, also gave strength and versatility to the school, and added much to the stimulating intellectual atmosphere of the great community in which they lived. It was the Edinburgh of this period that created Benjamin Rush, and others of that virile group which established the medical school of the University of Pennsylvania shortly before the Revolution.

Charles Darwin had the good fortune to become intimate with Andrew Duncan, a rising clinical teacher of the Edinburgh school (professor of the theory of medicine, 1790–1819). Duncan took Charles to live in his house and gave him personal guidance during his early years and access to the wards of the Royal Infirmary soon after he had entered the school. During these years Charles apparently kept in close touch with his father, and letters still in existence give an intimate first-

hand picture of the things about which they corresponded, and incidentally of the things that were stirring the imagination of this observant and enthusiastic young student, namely new ideas and modes of therapy then in use.

In the brief interval between the autumn of 1775 and the time of Charles Darwin's death, May 15, 1778, he completed his medical studies and won the esteem of all his teachers. For the Aesculapian Society at Edinburgh he submitted, in competition for their annual gold medal, a dissertation on the differences between mucus and pus. For this essay, Darwin received in March 1778 the gold medal offered by the society. For his graduating dissertation he chose as a subject the lymphatics and prepared a conventional thesis in classical Latin. This was translated by his father and republished in the volume mentioned above under the title *An account of the retrograde motion from the absorbent vessels of animal bodies in some diseases*. This was a more remarkable piece of work than the dissertation on pus and mucus, and it reflects the current teachings of Edinburgh concerning the relations of the lymphatics of dropsical conditions, and it also illustrates a very considerable independence of mind and a capacity to obtain evidence from well-conceived experiments.

A note on page 126 of Charles Darwin's dissertation states "There are other ingenious works of the late Mr. Darwin in the Hands of the Editor, which may perhaps at some distant Time be given to the public, if the medical World seems to require them." This note naturally aroused curiosity and to a certain extent it has been satisfied through the discovery in the Medical Society of London of an unpublished manuscript of 67 pages by Charles Darwin entitled *What are the established varieties of the pulse, their causes & uses in medicine*. Since studies on the pulse are mentioned in Erasmus's letters to Charles, April 1776, it is likely that the dissertation on the pulse represents one of his earliest pieces. This document reveals his powers as an observer more clearly than the two published dissertations mentioned above, and it illustrates, incidentally, that he had an excellent grasp of relevant contemporary literature on the heart and circulation. He discusses the causes and significance of the variations in the pulse and gives a clear description of normal variation with age and of the effect of various physiological states such as exercise, rest, eating, somnolence, etc.

No other unpublished manuscripts by Charles Darwin have been found.

Little wonder that the untimely death of such a youth should cause profound regret that found expression in a most surprising variety of channels. The circumstances of his death are described in the following paragraph from an anonymous obituary published in *Medical and Philosophical Commentaries* (Edinburgh, 1778, 5, 329-336).

About the end of April, Mr. Darwin had employed the greatest part of a day in accurately dissecting the brain of a child which had died of hydrocephalus, and which he had attended during its life. That very evening he was seized with severe head-ach. This, however, did not prevent him from being present in the Medical Society, where he mentioned to Dr. Duncan the dissection he had made, and promised the next day to furnish him with an account of all the circumstances in writing. But the next day, to his head-ach there supervened other febrile symptoms. And, in a short time, from the hemorrhagies, petechial eruption, and foetid loose stools which occurred, his disease manifested a very putrescent tendency. An, notwithstanding the skill of Drs. Cullen and Black, who attended him from the beginning of his affection; notwithstanding the anxious care and attention of his father, Dr. Darwin, a physician of great eminence in England, who arrived at Edinburgh some days before his death, his disease at length terminated fatally.

In addition to three detailed obituaries published within a few weeks of his death, accounts of Darwin found their way into contemporary biographical dictionaries such as Hutchinson's *Biographia medica*, and later into the *Biographie universelle* (vol. 10). Much the most interesting contemporary document, however, is an anonymous poem entitled *An elegy on the much-lamented death of a most ingenious young gentleman, who lately died in the College at Edinburgh where he was a student*. Only one copy of this has been traced and it was sold in 1931 by Messrs. Blackwell of Oxford to Mr. Paul B. Victorius, then of New York and now of London, who has generously allowed me to have the title-page reproduced and a rotograph made of the text. A manuscript note attributes the elegy to 'Mr. Jackson,' though not identified with certainty, it is possibly Richard Jackson, a prebendary, who was living in Lichfield in 1778, or John Jackson, the historian of Lichfield. There are references throughout the elegy to Charles's early education, his reading of learned authors, his interest in observation of natural objects and to his instincts for collecting.

Dr. Andrew Duncan's affection for Charles Darwin was such that he caused him to be buried in his family vault in the Chapel of Ease of St. Cuthbert's at Edinburgh, now known as the Buccleuch Parish Church Burying Ground. The tablet is the first one on the South wall of this vault and it bears among other things the inscription "He cultivated with success the friendship of ingenious men and was buried by the favor of Dr. A. Duncan in this his family vault."

Such then was the career of the first Charles Darwin, and it would almost seem that Nature, thwarted in her first endeavor, caused another Charles Darwin to see the light of day.

IV. THE DARWINS AND DIGITALIS

One of the remarkable features of Charles Darwin's book is a description of the therapeutic effects of the decoction of foxglove. Nine case histories are given, appended rather casually on pages 103–112 after the following heading: "A note belonging to page 65, and 68." One would naturally infer that they were cases

seen and described by Charles himself, for there is nothing, except their position in the text, to suggest that they were inserted by his father. They are prefaced by the following sentence: "The foxglove has been given to dropsical patients in this country with considerable success: the following cases are related with design to ascertain the particular kinds of dropsy, in which this drug is preferable to squill, or other evacuants." The case-reports are important since they contain the first accurate description of the therapeutic effect of digitalis in cardiac oedema published in any language, antedating Withering's celebrated book, *An account of the foxglove*, by five years.

The question arises whether these cases were described by Charles or by Erasmus. There is no direct statement in the book, but the evidence is overwhelmingly in favour of their having been appended to Charles's thesis by his father. In the *Medical Transactions* of the College of Physicians (London) for 1785 (vol. 3, p. 258) Erasmus Darwin says, "In a pamphlet entitled 'Experiments establishing a criterion between mucaginous and purulent matter, with an account of the retrograde motions of the absorbent vessels,' printed for Cadell, 1780, I subjoined about half a dozen cases of dropsies treated successfully by the decoction of *digitalis*; and endeavoured to distinguish the species of dropsies, in which it would generally succeed. To that account I could now add at least a score of other cases, cured by the same method, of those kinds of dropsy, the seat of which is supposed to be in some part of the *thorax*, and which is attended with *anasarca* of the limbs."

Though Erasmus Darwin was inclined to be unscrupulous, there is scarcely reason to believe that he would claim for himself work that had been done by his son. In the *Zoonomia*, published in 1794 (vol. 1, p. 326), a similar reference is made to his having appended a description of cases treated with foxglove to his son's thesis. Granting then that his statements are accurate, how did it come about that he used and described the effects of digitalis before Withering's celebrated book was published?

Erasmus Darwin has two definite claims to priority in publication: the appendix to his son's thesis which appeared in 1780, and the second paper which was dated Jan. 14, 1785, and read March 16, 1785, bearing the title "An account of the successful use of foxglove, in some dropsies, and in the pulmonary consumption," which as already mentioned, appeared in the *Medical Transactions*. This paper seems to be little known, and is not referred to by Withering. Well described case reports are given with many more details in each one than had been included in the account of 1780. All the classical symptoms are mentioned, and it was evidently Darwin's practice to push the drug until it produced symptoms of

nausea and diarrhoea. Darwin was not the incisive clinical observer that we find in Withering, but his descriptions are not without great merit. His critical faculties were less acute than those of his Birmingham contemporary, and they allowed him to recommend the drug for pulmonary consumption.

Nowhere in any of Darwin's writing on digitalis is Withering's name mentioned, and there is no explanation of how he came to use the drug. The first case in his appendix of 1780 was evidently seen in consultation with Withering, for it is recorded in Withering's book as Case No. IV. Here one finds the probable explanation of Darwin's use of the drug.

It is clear from one case report that Withering was annoyed with Darwin for having published a somewhat garbled and incomplete account of the case which they had seen in consultation. Withering's reference stating that Darwin had trusted to his memory for the details of the case are largely, but not entirely, correct for one finds in Darwin's *Commonplace book* (unpublished, p. 8) the following entry:

"Miss Hill of Aston near Newport on July 1776 had been indisposed sometime and was then seized with a cough and afterwards a spitting of digested mucus . . . "R Fol. Digitalis."

No mention is made, however, of having seen the case with Withering.

Withering's testimony, however, is clearly correct, that Erasmus Darwin first became acquainted with the action of digitalis on the 25th of July 1776 when seeing Miss Hill in consultation with him. If one applies modern standards of ethics one must conclude that the grandfather of the celebrated naturalist was somewhat unscrupulous. If priority of publication means anything in these circumstances he indeed has a legitimate claim over Withering. However, one must recognize that it was Withering, and not Darwin, who convinced his medical contemporaries, and it was he who inaugurated the systematic use of the drug; he kept full records of his results, and published after an interval of ten years of careful observation, a full and systematic treatise on its action. Withering's preface is dated "Birmingham, 1st July, 1785." The book itself, presumably appeared sometime in the autumn of that year.

Charles Darwin is mentioned only once in Withering's book, but the passage bears out our inference concerning the likelihood that Erasmus Darwin had informed his son of the action of digitalis. On page 8 Withering states:

"I am informed by my very worthy friend Dr. Duncan, that Dr. Hamilton, who learnt its use from Dr. Hope, has employed it very frequently in the Hospital at Edinburgh. Dr. Duncan also tells me that the late very ingenious and accomplished Mr. Charles Darwin, informed him of its being used by his father and

myself, in cases of Hydrothorax, and that he has ever since mentioned it in his lectures, and sometimes employed it in his practice."

SUMMARY

The evidence which I have just summarized establishes priority of publication concerning the action of digitalis for Erasmus Darwin, but on every other ground, Withering deserves full credit for the discovery. Charles Darwin, the medical student, had been informed of its action by his father and had attempted to account for it on the basis of improvement of lymphatic drainage. But the work, accomplished by the first Charles Darwin is less significant than the abundant evidence of his intellectual ability and precocity, and I have ventured to lay the details of his career before you because of their intrinsic interest and in the hope that the information will serve in a small way to clarify the unsolved problem of the relation of nature to nurture in establishing mental traits and capacities.